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(72) Inventor JOHN HAMILTON GILLON



## (54) IMPROVEMENTS IN OR RELATING TO TRAILER BRAKES

(71) We, GILLON BROS. (LIMSPREADERS), a British Company, of Lower Harbour, Perth, PH2 8BD, Great Britain, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to trailer braking systems and to apparatus for operating same.

According to the present invention, there is provided a trailer equipped with wheel brakes operable by means of a brake cable, rod or the like, a piston-and-cylinder device mounted on the trailer, the piston of said device being acted on by a spring urging the piston towards one end of the cylinder, the piston having a piston-rod whose free end is connected to said brake cable, rod or the like to apply the wheel brakes when the piston is moved by said spring, the cylinder having at said one end a fluid connection for admitting fluid to the cylinder, the trailer being hitched to an agricultural tractor having an engine-powered hydraulic system, and a conduit connecting said fluid connection with an auxiliary outlet of the tractor hydraulic system.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 shows in diagrammatic form a trailer braking system in accordance with the present invention; and

Fig. 2 is a longitudinal sectional view of a piston-and-cylinder device shown in Fig. 1 but to a larger scale.

In the drawings, a trailer axle and wheels are shown respectively at 10 and 11. The trailer has a frame or chassis, a portion of which is indicated at 12. The trailer is also provided with a braking system for braking the wheels 11, said system comprising wheel brakes 13 each of which is operable by a main cable or rod 14 through the agency of a brake equaliser 15 and individual brake cables or rods 16.

Apparatus for operating the brakes 13 consists of a spring-loaded piston and cylinder device indicated generally at 17. The cylinder 18 is anchored to the trailer chassis 12 by means of an appropriate mounting bracket 19. The free end portion of a piston rod 20 of the device 17 is attached to the main brake cable or rod 14 which is tensioned to apply the trailer brakes 13 by virtue of the spring-loading of the device 17. The end of the cylinder 18 which is remote from the piston rod 20 is provided with a connection through which hydraulic fluid can enter and leave the device 17.

The construction of the device 17 is seen in greater detail in Fig. 2. For practical application, the cylinder 18 is approximately fifteen inches long and three-and-one-eighth inches outside diameter. An anchorage member 19A (corresponding with the bracket 19 in Fig. 1) is welded to the cylinder 18. The piston rod 20 is attached to a piston 20A which in turn co-operates with a rubber cup 20B so as to define a working chamber 20C. An apertured end member 21 serves to guide the piston rod 20 and also provides support for one end of a compression spring 22, the other end of which bears against the piston rod face of the piston 20A. An end member 23 is provided with a connection 24 whereby hydraulic fluid can be admitted to and released from the working chamber 20C. The end members 21 and 23 are welded in position as shown in Fig. 2. The compression spring 22 is given a small pre-loading force of approximately ten pounds. The rate of the compression spring 22 should lie in the region of six hundred to one thousand pounds per inch. The working stroke of the piston in the device 17 should be in the region of two to four inches.

In use, with the cylinder 18 anchored to a frame or chassis member as shown in Fig. 1, the length of the main brake cable or rod 14 is adjusted so that the spring 22 is compressed to a force of approximately one-thousand-eight-hundred pounds, which force fully applies the brakes 13 through the agency of

the equaliser 15. It should be noted that the equaliser 15 preferably has a leverage ratio in the region of 6:1. To release the brakes, hydraulic fluid under pressure is admitted through the connection 24 so as to move the piston 20A a distance sufficient to unload the main brake cable or rod 14 and transfer all of the force of the spring 22 to the fluid in the working chamber 20C. The source of hydraulic fluid under pressure is an auxiliary outlet of the engine-powered hydraulic system of an agricultural tractor which is provided with means for controlling manually the hydraulic pressure supplied from the auxiliary outlet to an external attachment. The trailer brakes are applied by releasing the hydraulic pressure in the working chamber 20C so that the hydraulic fluid therein is returned to the tractor hydraulic system by the compression spring 22.

The construction of the apparatus described above is relatively simple and cheap. The device 17 can be incorporated in a new trailer during manufacture, or installed in an existing trailer easily and with the minimum of modification to the trailer chassis or braking system and permits the modified trailer braking system to be controlled easily from the driving seat of an agricultural tractor. Using the tractor hydraulics, the trailer brakes can be controlled smoothly while the trailer is being towed, and also applied fully for parking purposes.

#### 35 WHAT WE CLAIM IS:—

1. A trailer equipped with wheel brakes operable by means of a brake cable, rod or the like, a piston-and-cylinder device mounted on the trailer, the piston of said device being acted on by a spring urging the piston towards one end of the cylinder, the piston having a piston-rod whose free end is connected to said brake cable, rod or the like to

apply the wheel brakes when the piston is moved by said spring, the cylinder having at said one end a fluid connection for admitting fluid to the cylinder, the trailer being hitched to an agricultural tractor having an engine-powered hydraulic system, and a conduit connecting said fluid connection with an auxiliary outlet of the tractor hydraulic system.

2. The trailer and tractor combination claimed in Claim 1, wherein the said spring is a compression spring the ends of which press respectively on an end wall of the cylinder and on the piston-rod face of the piston

3. The trailer and tractor combination claimed in claim 2, wherein the compression spring exerts a small pre-loading force on the piston when the latter is at one extremity of its travel within the cylinder.

4. The trailer and tractor combination claimed in claim 2 or 3, wherein the rate of the compression spring is in the range six hundred to one thousand pounds per inch.

5. A trailer having wheel brakes operable by means of a spring-loaded piston-and-cylinder device substantially as hereinbefore described with reference to and as shown in the accompanying drawings, the trailer being hitched to an agricultural tractor having an engine-powered hydraulic system, and a conduit connecting said piston-and-cylinder device with an auxiliary outlet of the tractor hydraulic system.

FITZPATRICKS,  
Chartered Patent Agents,  
14-18 Cadogan Street,  
Glasgow G2 6QW.  
and  
Warwick House,  
Warwick Court,  
London WC1R 5DJ.

